



Annual Reports :: Year 6 :: University of California, Los Angeles

Project Report: Orbital stability of terrestrial planets and asteroids

**Project Investigator:**

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## Project Progress

These advances were made in relation to establishing the effects of orbital dynamics on the prospects for habitability:

1. Searching for stable orbits for terrestrial planets in extrasolar planetary systems.

In collaboration with the NAI team of the Carnegie Institution of Washington, we are carrying out a systematic search for stable orbital configurations in the gravitational three-body problem. We are looking for stable periodic orbits in resonances, which are centers of librations. We finished an exhaustive exploration of the 2:1 resonance in the restricted three-body problem, in which a small body is in resonance with a giant planet. We determined the regions of stability for a wide range of masses and eccentricities of the giant planet. Our visitor from France, J. Couetdic, revised the software to facilitate an automated search of all potentially important resonances. We are now preparing to implement the new software and to link the output to web pages in real time.

2. Long-term orbital simulations of the Solar System

We have published our first paper on accurate, long-term simulations of the orbits of the planets.

## Highlights

- There is now a very extensive map of stable orbits in the 2:1 orbital resonance.

## Roadmap Objectives

- **Objective No. 1.1:** Models of formation and evolution of habitable planets

## Cross Team Collaborations

Collaboration with Alan Boss' group at the Carnegie Institution of Washington's DTM.